



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of OKAZAKI et al.

Serial No.: 09/883,406

Art Unit: 1711

Filed : June 19, 2001

Examiner : MCCLENDON, Sanza L.

For : CROSSLINKABLE RESIN COMPOSITIONS

Declaration

Honorable Commissioner of Patents and Trademarks  
Washington, D.C. 20231

Sir:

I, Eiichi OKAZAKI, do hereby declare that:

I graduated in March 1991 from the master course of the Graduate School of Engineering of Kyoto University majoring in synthetic chemistry, and since then have been employed by TOAGOSEI CO., LTD., and have been engaged in researches in Nagoya Institute (currently called Macromolecular Material Research Laboratory) of the company from April 1991 while having been concurrently engaged in the HOG project of the company from February 2003 to July 2004;

I have read and understood the specification of the present application, and am familiar with the prosecution history of said application, and I have read and understood the office action issued on January 11, 2005 against the corresponding Japanese patent application No. 2000-183432 and the reference JP-07-102027-A cited therein;

I made the following experiments, and submit herein results of the experiments in order to show that the reference JP-07-102027-A (hereinafter simply referred to as "JP-07-102027-A") does not suggest the present invention.

### Experiments

#### 1. Purpose

The experiments were conducted to prepare compositions containing the below-described polymer (a) or (b) and compare them with the present composition containing the below-described polymer (A), in order to show that the present composition is superior in properties to the compositions suggested in JP-07-102027-A.

##### 1-1. Polymer (A)

Polymer (A) is a polymer that contains a maleimido group represented by the following formula (1):

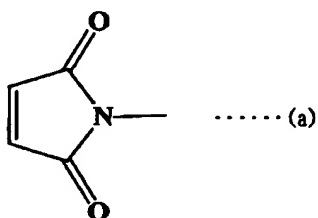


wherein (i) one of R<sup>1</sup> and R<sup>2</sup> represents a hydrogen atom while the other represents an alkyl group having 4 or less carbon atoms, (ii) both R<sup>1</sup> and R<sup>2</sup> represents an alkyl group having 4 or less carbon atoms, or (iii) R<sup>1</sup> and R<sup>2</sup> are a saturated

hydrocarbon group in the form of a carbocyclic structure, and an ethylenically unsaturated group.

1-2. Polymer (a)

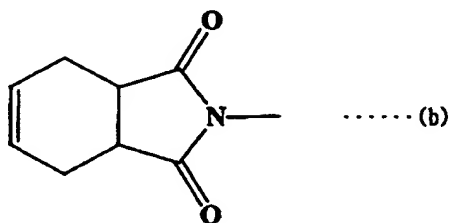
Polymer (a) is a polymer that contains a maleimido group represented by the following formula (a):



and an ethylenically unsaturated group.

1-3. Polymer (b)

Polymer (b) is a polymer that contains a maleimido group represented by the following formula (b):



and an ethylenically unsaturated group.

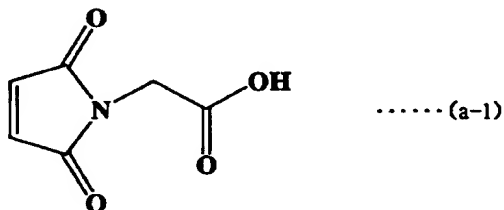
2. Method of Experiments

(1) Comparative production example 1-3

A prepolymer was produced by carrying out polymerization in the same manner as in production example 1-8 described on

page 50, lines 1-12 of the present specification, except that the amount of MMA was changed to 28 grams.

A copolymer C1-3 was then produced by carrying out reaction in the same manner as in the production example 1-8, except that 22 grams (0.14 mol) of a compound represented by the following formula (a-1) (hereinafter referred to as "ML-GL") was used in place of 30 grams (0.14 mol) of THPI-GL as a raw material.

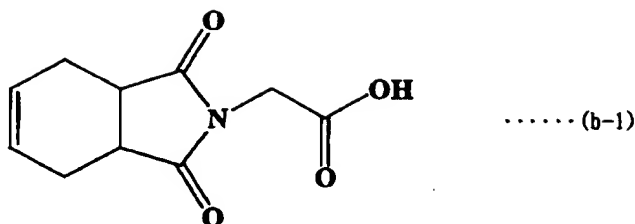


Number average molecular weight (Mn), weight average molecular weight (Mw) and percentage of nonvolatile matter (NV) of the resultant copolymer C1-3 are shown in Table 1.

#### (2) Comparative production example 1-4

A prepolymer was produced by carrying out polymerization in the same manner as in the production example 1-8.

A copolymer C1-4 was then produced by carrying out reaction in the same manner as in the production example 1-8, except that 30 grams (0.14 mol) of a compound represented by the following formula (b-1) (hereinafter referred to as "4TH-GL") was used in place of 30 grams (0.14 mol) of THPI-GL as a raw material.



Number average molecular weight (Mn), weight average molecular weight (Mw) and percentage of nonvolatile matter (NV) of the resultant copolymer C1-4 are shown in Table 1.

Table 1

	Amount of monomers in copolymer (g)					Mn *10 <sup>-3</sup>	Mw *10 <sup>-3</sup>	NV (%)
	Prepolymer							
	MMA	GMA	ML-GL	4TH-GL	AA			
C1-3	28	40	22	-	10	12.9	35.1	50.1
C1-4	20	40	-	30	10	15.3	40.5	49.7

### (3) Comparative Examples 1-3 and 1-4

Compositions were prepared in the same manner as in Example 1-1 described on page 51, lines 7-16 of the present specification, except that the components were used as shown in Table 2.

The obtained compositions were evaluated in the same manner as in Example 1-1 described from page 51, line 17 through page 54, line 7 of the present specification. The results are shown in Table 2. Meanwhile, the composition of Comparative Example 1-4 was unable to be evaluated because the coated surface did not cure after it passed under the UV lamp 10 times.

### 3. Results

The results obtained in the above item 2 are shown in Table 2.

Table 2

Comparative Example	Copolymer		Component (B) M350 <sup>1)</sup>	Curability (number of passes)	Durability		Abrasion resistance	Adhesion	Odor
	C1-3	C1-4			Appearance	Color difference $\Delta E$			
1-3	50	-	50	2	× <sup>2)</sup>	1.3	○	△	○
1-4	-	50	50	Not cured after 10 passes	Impossible to evaluate				

1) M-350: ethylene oxide 3-mol modified triacrylate of trimethylolpropane (Aronix M-350 (trade name) manufactured by Toagosei Co., Ltd.)

2) Whitening appeared on the coated surface.

### 4. Discussion

Apparently from Table 1-3 shown in page 54 of the present specification, the present composition was excellent in curability, and the cured product thereof was excellent in durability, abrasion resistance and adhesion and free from odor.

On the other hand, apparently from Table 2 above, the composition of Comparative Example 1-3 that contained the polymer having the maleimido group represented by the above formula (a) was excellent in curability, but the cured product thereof was unsatisfactory in terms of durability and adhesion, particularly, durability. The durability was evaluated under a wet condition, and thus the composition of Comparative Example 1-3 was also unsatisfactory in terms of water resistance of the cured product.

The composition of Comparative Example 1-4 that contained the polymer having the maleimido group represented by the above formula (b) was unsatisfactory in terms of curability, and was unable to be evaluated on cured products.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: March 30th, 2005

  
Eiichi OKAZAKI